CLAIMS

1. A apparatus for processing image, said apparatus comprising:

motion vector detection means for detecting a motion vector by using an image that is made up of multiple pixels and acquired by an image sensor having time integration effects;

time resolution creation means for generating an image that has a higher time resolution than that of the image made up of the multiple pixels by using the motion vector detected by the motion vector detection means and the image made up of the multiple pixels; and

motion-blurring-mitigated image generation means for generating a motion-blurring-mitigated image in which motion blurring of a moving object is mitigated by using the motion vector detected by the motion vector detection means on the assumption that a pixel value of pixel of the moving object in the image is a value obtained by integrating, in a time direction, a pixel value of each pixel in which no motion blurring that corresponds to the moving object occur as it is moved.

2. The apparatus for processing the image according to claim 1, wherein the motion vector detection means detects a motion vector by using multiple images, each of which is made up of multiple pixels, acquired by the image sensor and, based on the detected motion vector, generates a motion vector for the image having the higher time resolution to supply this motion vector to the time resolution creation means.

3. The apparatus for processing the image according to claim 1, wherein the motion vector detection means detects a motion vector by using multiple images, each of which is made up of multiple pixels, acquired by the image sensor, corrects the detected motion vector in accordance with exposure lapse of time, and supplies it to the motion-blurring-mitigated image generation means.

4. The apparatus for processing the image according to claim 1, wherein the time resolution creation means uses the motion-blurring-mitigated image to generate an image having a higher time resolution than that of the motion-blurring-mitigated image.

5. The apparatus for processing the image according to claim 4, wherein the time resolution creation means comprises:

class determination means for determining a motion vector of a target pixel in the image, to be created, with the higher time resolution, by using the motion vector detected by the motion vector detection means, extracting as a class tap multiple pixels that correspond to the target pixel from the motion-blurring-mitigated image, and determining a class that corresponds to the target pixel based on a pixel value of the class tap;

storage means for learning prediction coefficients each for predicting a target pixel based on multiple pixels in a first image for each class between the first image and a second image, said first image having a time resolution that corresponds to the motion-blurring-mitigated image, said second image having a higher time resolution than that of the first image, said multiple pixels in the first image

corresponding to the target pixel in the second image, to store the generated prediction coefficients for each class; and

prediction value generation means for detecting from the storage means a prediction coefficient that corresponds to a class determined by the class determination means, extracting as a prediction tap multiple pixels that correspond to the target pixel in the image to be generated from the motion-blurring-mitigated image, and generating a predictive value corresponding to the target pixel according to one-dimensional linear combination of the predictive coefficients detected from the storage means and the predictive tap.

6. A method for processing an image, said method comprising:

motion vector detection step of detecting a motion vector by using an image made up of multiple pixels acquired by an image sensor having time integration effects;

time resolution creation step of generating an image that has a higher time resolution than that of the image made up of the multiple pixels by using the motion vector detected in the motion vector detection step and the image made up of the multiple pixels; and

motion-blurring-mitigated image generation step of generating a motion-blurring-mitigated image in which motion blurring of a moving object is mitigated by using the motion vector detected in the motion vector detection step on the assumption that a pixel value of pixel of the moving object in the image is a value obtained by integrating, in a time direction, a pixel value of each pixel in which no motion blurring that corresponds to the moving object occur as it is moved.

7. The method for processing the image according to claim 6, wherein in the motion vector detection step, a motion vector by using multiple images, each of which is made up of multiple pixels, acquired by the image sensor is detected and, based on the detected motion vector, a motion vector for the image having the higher time resolution is generated and supplied to the time resolution creation step.

8. The method for processing the image according to claim 6, wherein in the motion vector detection step, a motion vector is detected by using multiple images, each of which is made up of multiple pixels, acquired by the image sensor, and the detected motion vector is corrected in accordance with exposure lapse of time and supplied to the motion-blurring-mitigated image generation step.

9. The method for processing the image according to claim 6, wherein in the time resolution creation step, the motion-blurring-mitigated image is used to generate an image having a higher time resolution than that of the motion-blurring-mitigated image.

10. The method for processing the image according to claim 9, wherein the time resolution creation step comprises:

class determination step of determining a motion vector of a target pixel in the image, to be created, with the higher time resolution, by using the motion vector detected in the motion vector detection step, extracting as a class tap multiple pixels that correspond to the target pixel from the motion-blurring-mitigated image, and determining a class that corresponds to the target pixel based on a pixel value of the class tap;

storage step of learning prediction coefficients each for predicting a target pixel based on multiple pixels in a first image for each class between the first image and a second image, said first image having a time resolution that corresponds to the motion-blurring-mitigated image, said second image having a higher time resolution than that of the first image, said multiple pixels in the first image corresponding to the target pixel in the second image, to store the generated prediction coefficients for each class; and

prediction value generation step of detecting from the storage step a prediction coefficient that corresponds to a class determined by the class determination step, extracting as a prediction tap multiple pixels that correspond to the target pixel in the image to be generated from the motion-blurring-mitigated image, and generating a predictive value corresponding to the target pixel according to one-dimensional linear combination of the predictive coefficients detected from the storage step and the predictive tap.

11. A program allowing a computer to perform:

motion vector detection step of detecting a motion vector by using an image made up of multiple pixels acquired by an image sensor having time integration effects;

time resolution creation step of generating an image that has a higher time resolution than that of the image made up of the multiple pixels by using the motion vector detected in the motion vector detection step and the image made up of the multiple pixels; and

motion-blurring-mitigated image generation step of generating a motion-blurring-mitigated image in which motion blurring of a moving object is mitigated by using the motion vector detected in the motion

vector detection step on the assumption that a pixel value of pixel of the moving object in the image is a value obtained by integrating, in a time direction, a pixel value of each pixel in which no motion blurring that corresponds to the moving object occur as it is moved.